

# Technology Spotlight

## Use of Rupture Pin Shutoff Devices to Protect Pipelines

**G**ulfTerra Energy Partners, previously known as El Paso Field Services, recently implemented a new technology—developed through a cooperative effort between its field technicians and one of its equipment suppliers—to replace pipeline relief valves with rupture pin shutdown devices.

Traditionally, relief valves were installed to protect gathering and transmission systems from over-pressurizing when lines became blocked with hydrates. In an instance of hydrate plugging, relief valves would simply open and vent large quantities of methane into the atmosphere and still allow upstream compressors to continue to run. In this scenario, gas emissions could continue for long periods of time until they were detected by maintenance or operations employees, usually by hearing the gas venting through the relief valve.

Rupture pin devices, which replace the common pressure relief valve, simply consist of a pressure sensitive pin that holds the plug of a valve-like device in the open position. When a gas line's pressure reaches the set rupture pressure, the pin deforms and allows a spring-loaded plug to close, shutting off the gas flow and protecting the downstream pipelines. Any upstream compressors continue to operate until reaching the control shutdown pressure level. Since GulfTerra remotely monitors the pressure and flow from each delivery, dispatchers receive an indication of problems instantaneously. This is preferable to allowing the relief valve to vent for unknown periods of time and being discovered randomly, which was commonplace prior to rupture pin installation. The rupture pin is then replaced once the blockage is cleared and is reset to activate at the proper pressure. By utilizing this technology, the design pressure of the system is not jeopardized and no gas is vented into the atmosphere.



Alfred Wussler, a PSM Safety Coordinator with Enterprise Products (which recently purchased GulfTerra), stated that the use of rupture pins was originally designed to remedy the frequent problem of hydrate blocking in the San Juan Basin and that the practice would be effective for any location where a

flow blockage results in relief valve activation for overpressure protection.

Wussler also stated that the use of rupture pins requires that any compressor upstream of a rupture pin device must be equipped with a standard high discharge pressure shutdown so the compressors shut down when a rupture pin activates. It is also very beneficial, but not required, that any measured gas flow be monitored, and that an alarm sounds when the gas flow stops. This ensures prompt detection of a closed rupture pin device.

### Costs and Benefits for Rupture Pin Device Installation

Capital Costs (including installation): \$1,000-\$10,000

Operating and Maintenance Costs (Annual): \$100-\$1,000

Methane Savings: 205 Mcf per valve per event

Payback (Years): 0-1

*Continued on page 8* ★ ★ ★

# Use of Rupture Pin Shutoff Devices

Continued from page 7 ★ ★ ★

## Methane Emissions Reductions

The conversion to rupture pin devices reduces gas previously lost through open relief valves. GulfTerra estimated its emission reductions by calculating the flow rate of an equivalent 2" x 3" relief valve flowing at the system design (set) pressure. At 250 psig, this is about 3,421 standard cubic feet per minute (scfm) x 60 minutes = 205,260 scf saved per event. This estimate is conservative because it is highly likely that the relief valve would vent for longer than one hour before it is detected. At \$5 per Mcf a company could realize more than \$1,000 in gas savings per event, achieving a payback on the investment the first time the device activates. Actual savings will depend upon the size and set pressure of the equivalent relief valve replaced with a rupture pin device.



## MMS Inventories and Data Recently Released

The Minerals Management Service (MMS) recently released three large inventory and data collection publications and software programs.

- ★ The 2000 Gulfwide emissions inventory files and report
- ★ The 2000-2001 Breton Area emissions inventory files and report
- ★ The 2005 Gulfwide Offshore Activity Data System (GOADS) reporting software and user's guide

All of these documents are available online at [gomr.mms.gov/homepg/regulate/environ/requirements.html#Air%20Quality](http://gomr.mms.gov/homepg/regulate/environ/requirements.html#Air%20Quality).

The installation of rupture pins is an important element of GulfTerra's daily operations because rupture pins shut-in the system's gas flow rather than allowing the gas to vent, which reduces equipment shutdowns (requiring staff time and causing a loss of revenue). In addition to the use of rupture pin devices, associated control systems can be used to discover equipment shutdowns much more quickly, thus leading to more focused, quicker responses to system problems. In addition, normal operations are resumed more quickly and lost revenue caused by downtime is reduced.

Economic benefits go beyond gas savings. For example, rupture pin devices do not require operational or maintenance costs unless the rupture pin engages; typical relief valves require annual valve checks during routine maintenance.

## Automating Operations

Continued from page 3 ★ ★ ★

It is important to note that just because a company automates its equipment, it does not mean that it will experience success immediately. In addition to expending the capital to pay for the automation equipment, companies must also train their staff in using this new automation equipment to reap its benefits. Operators must be computer literate and receive training for properly using automation systems to diagnose system problems.

For more information on automated air/fuel ratio controls for engines and compressors, see the new Gas STAR PRO Fact Sheet, *Automated Air/Fuel Ratio Controls*. And for additional information on automated well production systems, see the PRO Fact Sheet titled, *Gas Well "Smart" Automation System*. These are both available online at [epa.gov/gasstar/pro/index.htm](http://epa.gov/gasstar/pro/index.htm).

Information for this article was derived from the following sources:

"Automation Reshapes Field Operations" by Kathy Shirley in the *American Oil & Gas Reporter*, August 2003.

"Results of Managing Compression Assets," presented by ChevronTexaco, May 2004.